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Diversity of damselfly (Suborder-Zygoptera) in the Victoria Park, reserved forest, Bhavnagar, Gujarat, India

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Abstract

Damselflies are exquisitely colored insects representing the order Odonata of class Insecta in the animal kingdom. Pervasive ecological importance of this charming group of insects makes them valuable to assess disturbance or environmental impact of various kinds in the ecosystem. The central theme of this study is to assay diversity of damselflies in the Victoria Park reserve forest, Bhavnagar city, Gujarat. (21°44'48" N 72°7'54" E) It is a favorable habitat for diversity of damselflies. The seasonal investigation carried out during the period of two years, particularly in monsoon season, 2014 to 2015. During this study total 10 species of damselflies belonging to 3 families and 7 genera were identified and recorded. It is observed that out of the total 10 species, 30% species belongs to genus *Ischnura*, 20% species of genus *Ceriatagrion*, while genera like *Agriocnemis*, *Pseudagrion*, *Enallagma*, *Disparoneura*, *Lestes*, each constituting 10% Part. Maximum numbers of diversity were observed during August and September.

Keywords: Diversity, ecosystem, damselflies, reserved forest, aquatic

1. Introduction

The present communication aimed to explore the species richness and diversity of zygopterans in the Victoria Park reserved forest, Bhavnagar city, Gujarat. Zygoptera is one of the sub order of order Odonata. The ancient order Odonata comprises 3 suborders and majority of them belong to two suborders Anisoptera (Dragonflies) and Zygoptera (Damselflies) and latest recognized suborder is Anisozygoptera. About 6000 species of Odonates are found throughout the world. In India, about 500 species and sub species are reported [1].

In general, the adult Damselflies distinguished from that of Dragonflies by few prominent features like their button like eyes are much smaller and do not meet, their wings are identical, petiolate basally and held vertically at rest while in case of dragonflies hind wings are broader basally and held horizontally and are depressed at rest. Damselflies are weak fliers than dragonflies [2].

Damselflies are exquisitely colored hemimetabolous, amphibiotic, charming predaceous darning needles, representing the second largest aquatic insect order in the animal kingdom [3]. They exist since at least the lower Permian, and are found on every continent except Antarctica [4].

The life history of this beautiful creature is closely associated with wet lands. To have aesthetic pleasure in studying these insects, they could give us valuable insights about health of the ecosystem. As they are playing role of bio indicator as well as bio controller which is nowadays well established. Generally the adults are aerial, but the nymphs are aquatic and are also predaceous like the adult and are voracious feeders, feeding on winged insects like mosquitoes, flies, certain beetles etc. crashing the population of some harmful insects to mankind which have paved their way horribly in recent days in human civilization [1]. Damselflies are sensitive to the physicochemical properties of water and surrounding atmosphere hence the character of water habitat definitely affects the diversity of damselflies. Thus, it is the flagship insect community for fresh water ecosystem [4]. Shade and aquatic vegetation could favor zygopterans more which is supported by Subramaniam [5].

Earlier study has been carried out on one of the suborder of Odonata (Anisoptera) by one of the author (Devendra Solanki) in this field [6]. Good varieties of Dragonflies were found during that investigation indicating favorable habitat for the diversity of dragonflies. At that time habitat was analyzed with regards to the population status of dragonflies while here more emphasis is being given to the damselfly which is more sensitive to heat as well as character of the water bodies affecting diversity and abundance of Damselflies than that of the dragonflies.

2. Materials and methods

2.1 Study area

This study was conducted in the Victoria Park reserved forest (21°44'48" N 72°7'54" E) situated 3km south of the Bhavnagar city, Gujarat state, India. Total area covered by the forest is 202.74 hectares. Most of the area in the forest is plain but the western side is hilly and roguish. Park receives seepage water of Bortalav, which forms small water patches in the forest and nearby area. The main site for monitoring is the Krishnakunj Lake in the park as well as water patches present in park and nearby area.



Pic 1: Side view Krishnakunj Lake, Victoria Park reserved forest, Bhavnagar

2.2 Climatic conditions

Victoria Park reserved forest is semi arid region with very hot summers and cold winters. The average rainfall is about 500-550mm. The hot dry climate supports scrubby thorns, and xerophytic vegetation along with the marshy area surrounding the lake. Lake is shallower and harbor variety of aquatic vegetation. The reserved forest used to house hundreds of species of flora and fauna.

2.3 Survey method

The seasonal study was conducted during the period of two years in particular monsoon season years of 2014 and 2015. The study has been carried out in weekends and holidays in such a way that there should be at least one morning and one evening visit in each line transect in a week. Damsselfies were carefully observed in the field and were photographed by Canon SX 520 Point and Shoot digital camera and identified with the help of standard references and photo guides [1, 2, 7]. Using transect counting method, the population were monitored. The species which were observed and recorded during the study are listed in the Table.1; the species which were regularly observed during the visit are indicated as common while the species which were not frequently observed or rarely sited are indicated as occasional.

3. Results and Discussion

One can easily detect the dragonflies flying over water patches due to their helicopter like hovering nature, while in case of Damsselfies one need to zoom their view to observe this beautiful creature. Recent investigation is being carried out with single focus to evaluate the area as suitable or not for the abundance of this important group of insect. During

this study total 10 species of Damsselfies belonging to 7 different genera and 3 families were identified and recorded. The three different families are Coenagrionidae, Protoneuridae, and Lestidae. Among which Coenagrionidae (pond damsel) found dominantly comprising 5 different genera (71.42% of total genera) and 8 different species (80% of total species) were recorded. Genus *Ischnura* were dominant comprising 30% species of the total damsselfly species, followed by *Ceragrion* with 20% species while genera like *Agriocnemis*, *Pseudagrion*, *Enallagma*, along with Genus *Disparoneura* of family Protoneuridae, and Genus *lestes* of family Lestidae are with 10% species each. Species like *Ceragrion coromandelanum*, *Agriocnemis pygmaea*, *Ischnura senegalensis*, and *Pseudagrion decorum* are more dominating species observed during the study than other species like *Ischnura aurora*, *Ischnura nursei*, *Ceragrion olivaceum*, *Enallagma parvam* which is not very common. While some unexpected exotic species like *Disparoneura quabrimaculata* and *Lestes umbrinus* are rarely observed and recorded. Sometimes unusual weather patterns or dispersal nature of Damsselfies may occasionally bring them in the park. Many species found for a relatively very short period. Simple explanation of this could be given by affection of Damsselfies with different Climatic factor as well as the nature of water body.

Earlier an intensive work has been carried out on odonates in central Gujarat by V.B. Rohmare et.al. In which inventory of odonata was carried out in six districts (Anand, Kheda, Vadodara, Ahmedabad, Panchmahal, and Dahod) of central Gujarat during the period of 2012-14. At that time total sixteen species of Zygoptera (Damsselfies) were recorded and twenty-six species of Anisoptera (Dragonflies) were recorded. During their study Anand district was surveyed intensively and as a result maximum thirteen species were recorded than other districts. Except *Ceragrion olivaceum* and *Enallagma parvum*, rests of the species were already cited in their study [12].

It is observed that abundance of different species of damsselfly varied with different marginal patches of the lake, area having riparian vegetation and suitable marginal vegetation harbor rich diversity of Damsselfies. With the central theme of monitoring the damsselfly population in the area, various interesting behavior of Damsselfies like their cannibalistic nature, breeding behavior were also recorded which indicates the park as suitable accommodation for Damsselfies.

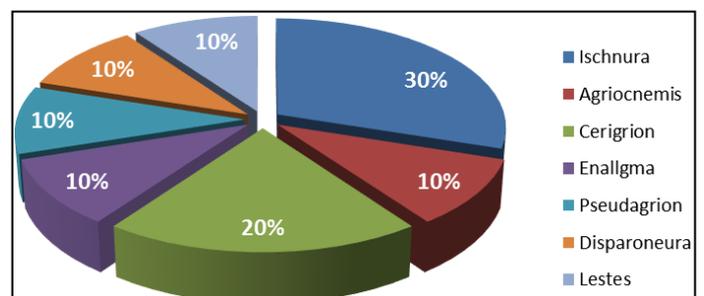


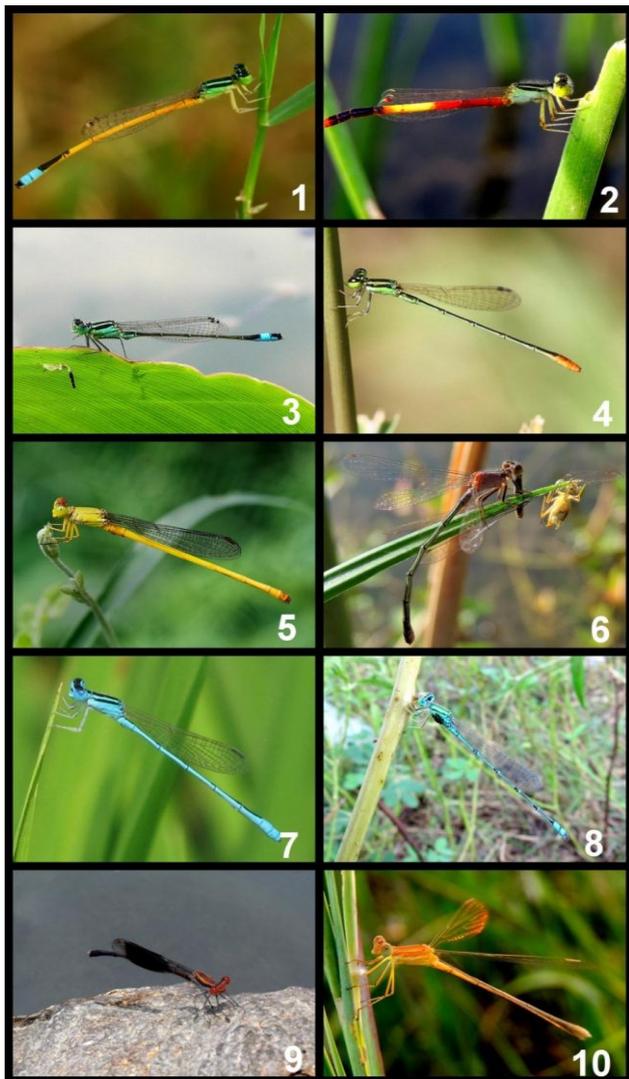
Fig 2: Percentile distribution according to the species with abundance of particular genus of Damsselfies in Victoria Park Reserved Forest, Bhavnagar city, Gujarat

Table 1: Checklist of Damselfly of Victoria Park reserved forest.

No.	Common name	Species name	Status
Family : Coenagrionidae			
1.	Golden dartlet	<i>Ischnura aurora</i>	O
2	Pixie dartlet	<i>Ischnura nursei</i>	O
3	Blue tailed dartlet /Senegal Golden dartlet	<i>Ischnura senegalensis</i>	C
4	Pigmy dartlet	<i>Agriocnemis pygmaea</i>	C
5	Coromandel marsh dart	<i>Ceriagrion coromandelanum</i>	C
6	Rusty marsh dart	<i>Ceriagrion olivaceum</i>	O
7	Azure dartlet	<i>Enallagma parvum</i>	O
8	Elegant sprite	<i>Pseudagrion decorum</i>	C
Family: Protoneuridae			
9	Black winged bamboo tail	<i>Disparoneura quabrimaculata</i>	O
Family : Lestidae			
10	Brown spread wing	<i>Lestes umbrinus</i>	O

Occasional: 06

Total: 10



1. *Ischnura aurora*,
2. *Ischnura nursei*,
3. *Ischnura senegalensis*,
4. *Agriocnemis pygmaea*
5. *Ceriagrion coromandelianum*,
6. *Ceriagrion olivaceum*,
7. *Enallagma parvum*,
8. *Pseudagrion decorum*,
9. *Disparoneura quadrimaculata*,
10. *Lestes umbrinus*

Pic 2: Photographs of Damselfly species of Victoria Park reserved forest

4. Conclusion

Victoria Park is generally favorable habitat for damselfly population but gradual influence of human in and around water bodies has an adverse effect on survival of the Damselflies. By careful observation it is found that minute changes in the climate which ultimately affect the vegetation and character of the water has dramatic influence on the diversity and abundance of the Damselflies more than the dragonflies. However, effective strategies for conservation of this important group of insect are required.

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